GGSO Disease Detectives 2018 Answer Key

1) B
2) C
3) A
4) A
5) B
6) D
7) C
8) B
9) B
10) B
11) D
12) D
13) C
14) A
15) a. intermittent b. point source c. propagated d. propagated e. continuous f. intermittent
16) a. Sampling bias b. Berkson's bias c. Follow up bias d. Healthy worker bias e. Social acceptability bias
17) Endotoxins are a part of bacteria/located on the cell surface/from gram negative bacteria (1 pt), exotoxins are secreted by bacteria/gram positive bacteria (1 pt); endotoxins usually are more harmful (1 pt)
18) No, since some foodborne illnesses are caused by toxins, even if bacteria die from heat, the toxins are still there and can make you sick
19) a, iii
20) c, i; dinoflagellates; shellfish
21) c, v
22) b, v
23) c,i; Entamoeba histolytica; veggies/fruits
24) a, v
25) d, iii
26) a, i; O157: H7/Shiga toxin-producing E. coli/STEC (no point if only E. Coli); beef/milk
27) c, v
28) b, iv
29) c, i; Cyclospora cayetanensis; fresh produce
30) a, vi
31) a, i; Salmonella; eggs/poultry/meat/unpasteurized milk/juice/cheese/contaminated raw veggies/fruits

32) a, vii

33) a, ii

34) e, i; Paragonimus westermani/lung fluke; undercooked crab/crawfish

35) e, i; Trichnella spiralis; pork/wild meat

36) c, ii

37) a, i; Clostridium Botulinum; any canned food

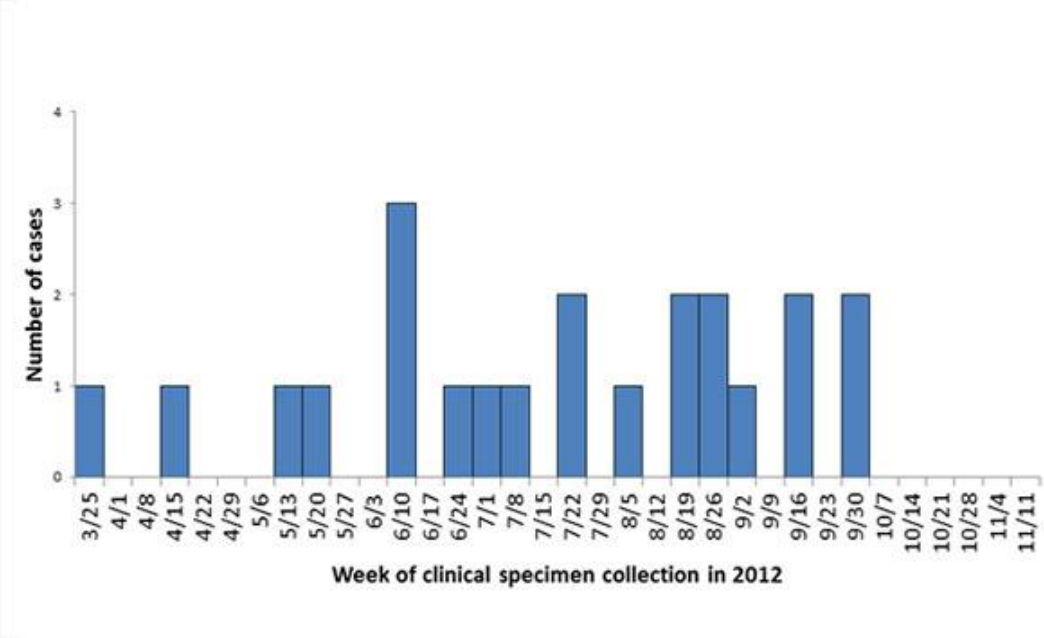
38) b, i; hepatitis A virus; raw produce

Case Study:

1) - seriousness of disease/high mortality rate
   -wide geographic area, higher than average
   - point source, easy to remove cause
   - prevent future outbreaks
   - research on pathogen and disease
   - any other logical reason
2) national network by CDC between public health and food regulatory agency laboratories (1 pt for collaboration), share **pulsed-field gel electrophoresis** (1 pt MUST HAVE WORD) of foodborne illness pathogens (1 pt)
3) blood or cerebrospinal fluid
4) 1 pt for setting up correctly (no pts if didn't show work), 1 pt for correct answer
   Sensitivity = 19/(19+3) = 0.864 = 86.4%
   Specificity = 16/(16+6) = 0.727 = 72.7%
   Positive predictive value = 19/(19+6) = 0.760 = 76.0%
   Negative predictive value = 16/(16+3) = 0.842 = 84.2%
   *don't need both decimal and percentage, either
5) 1 pt for pregnant women, 1 pt for either elderly or immune compromised
6) - High specificity, mean more of actually diseased will be detected
   - High negative predictive value, those who tested negative are actually no disease so more diseased detected
   - In general, want to make sure all that are actually diseased are detected so they can be treated, even if causes some no diseased to test positive; more on the safe side

- 1 pt for each answer, 1 pt for each explanation (give points if give correct explanation for wrong answer), 1 pt for general explanation (detect more diseased)

7) confirmed, probable, possible/suspected
8) Place: US (1 pt), Time: March 25 to October 26 of 2012 1 pt), Person: any person (1 pt), clinical info: have some of the following symptoms (fever, nausea, muscle aches, diarrhea) NO mention of lab verification (1 pt if have some kind of clinical info, 1 pt if modeled after possible case definition)
9) Persons infected with the outbreak-associated strain of *Listeria monocytogenes*, by date of clinical specimen collection



- 1 pt for drawing a histogram; if not a bar graph, no point given
- 1 pt for title
- 1 pt for each axis label (something along the lines of time of onset for x and # of cases for y)
- 1 pt for correct divisions for x-axis (1 week or 2 weeks)
- 5 pts for correct placement for bars (-1 for each incorrect bar, -5 for 5 or more mistakes)

10) descriptive epidemiology
11) 2-6 weeks OR 3-70 days, must be within a week on both ends of either
12) 6 weeks before 3/27 = 2/14 OR 70 days before 3/27 = 1/17; +/- 1 day

- 1 pt for use of longest incubation period and date of first case 3/27 (error follow through from question 11), 1 pt for correct answer

13) odds ratio

14) 1 pt for each correct set up (no pts if no work), 1 pt for correct answer

    Feta: (11*19)/(11*21) = 0.904

    Stilton: (12*34)/(10*6) = 6.80

    Brie: (15*30)/(7*10) = 6.429

    Mimolette: (8*24)/(14*16) = 0.857

    Ricotta: (18*25)/(4*15) = 7.50

15) The odds of getting listeriosis for those who ate ricotta are 7.50 times larger than the odds of getting listeriosis for those who didn't eat ricotta.
    - 1 pt for use of odds, 1 pt for larger in ate ricotta than no ricotta, 1 pt for use of odds ratio of ricotta (error follow through from question 15)

16) Brie, Stilton, Ricotta (error follow through from question 13, 2 pts if chose cheeses with highest odds ratio)

17) family members and neighbors inherently have a higher risk of exposure to the sickness than the general population (1 pt), may skew data so risk calculated is higher than what it should be (1 pt for specific mention that risk would be higher)

18) relative risk (1 pt) is ratio of incidence proportions between exposed and non-exposed groups, but we don't know the incidence proportion in a case control study since we don't know the total population at risk (1 pt unknown total population/can't calculate incidence)

19) recall error

20) - cross contamination
    - Confounding: people who eat ricotta might also like to eat other 2 kinds of cheese/bought together
    - Any other logical reason

21) Recall ricotta cheese from markets

22) 1 pt for correct column labels (no pts for disease/no disease), 1 pt for correct row labels, 1 pt for each correct value in correct spot on table

	Case	Control	Total
Ate ricotta	18	15	33
Did not eat ricotta	4	25	29
Total	22	40	62

*do not need total row and column

23) H_0: Eating ricotta and developing listeriosis are independent. (1 pt)

H_a: Eating ricotta and developing listeriosis are dependent, specifically eating ricotta increases the risk of developing listeriosis (1 pt)

Expected values: 1 pt for setting it up (no pts if no work), 1 pt for correct values; error follow through from question 22

(33*22)/62 = 11.7

(33*40)/62 = 21.3

(22*29)/62 = 10.3

(40*29)/62 = 18.7

$X^2 = (18-11.7)^2/11.7 + (15 – 21.3)^2/21.3 + (4-10.3)^2/10.3 + (25-18.7)^2/18.7 = 11.2$ (1 pt for setting up, 1 pt for correct value; error follow through from expected values)

df = 1

p-value < 0.05 (1 pt for stating a p-value, error follow through)

Therefore, the difference is statistically significant, so we can reject our null hypothesis and accept our alternative hypothesis. (1 pt for correct conclusion based on stated p-value, error follow through)

24) Production

25) food intoxication (1 pt); poisoning is pathogen produce toxins that make you sick (1 pt), intoxication is when pathogen itself makes you sick (1 pt)

26) need to wait a full incubation period after onset date of the last known case (1 pt), since anyone who was infected since then would’ve already developed illness (1 pt)

27) Clean, Cook, Chill, Separate

28) - increase food safety precautions on imported foods

- increase food safety rules in distribution centers
- prevent sick food employees from coming to work, ex. giving more sick days
- do periodic testing on certain high risk foods
- place more importance on washing hands
- education/raise awareness of foodborne illnesses
- any logical prevention method